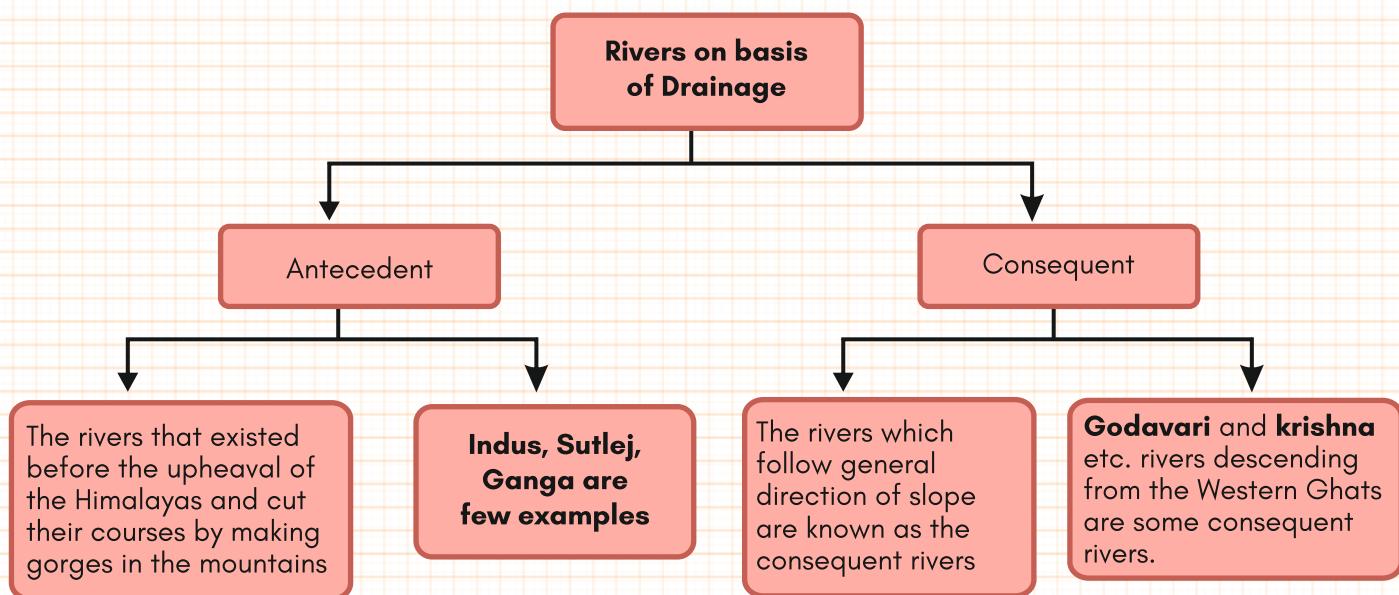


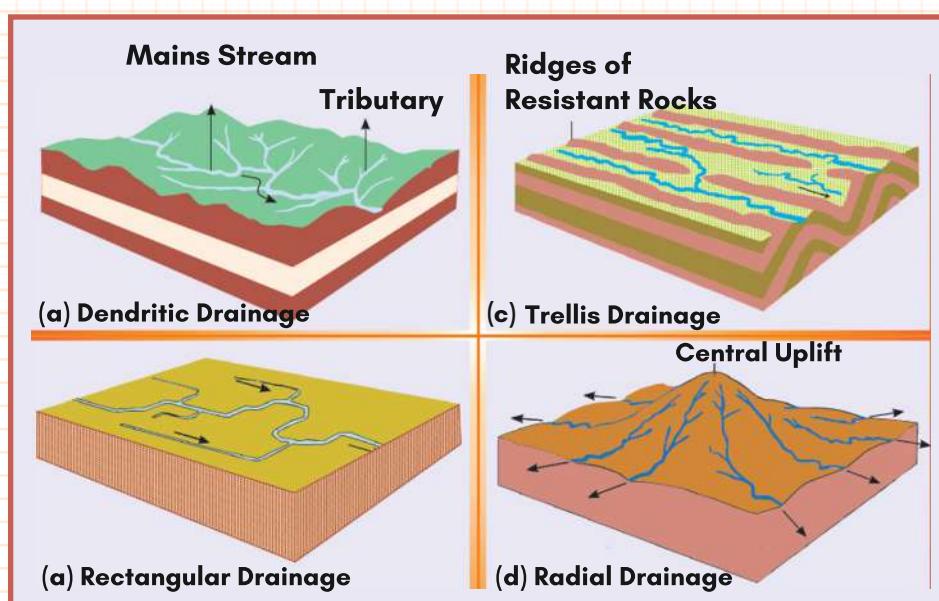
Quick Revision Module (UPSC Prelims 2022) Geography

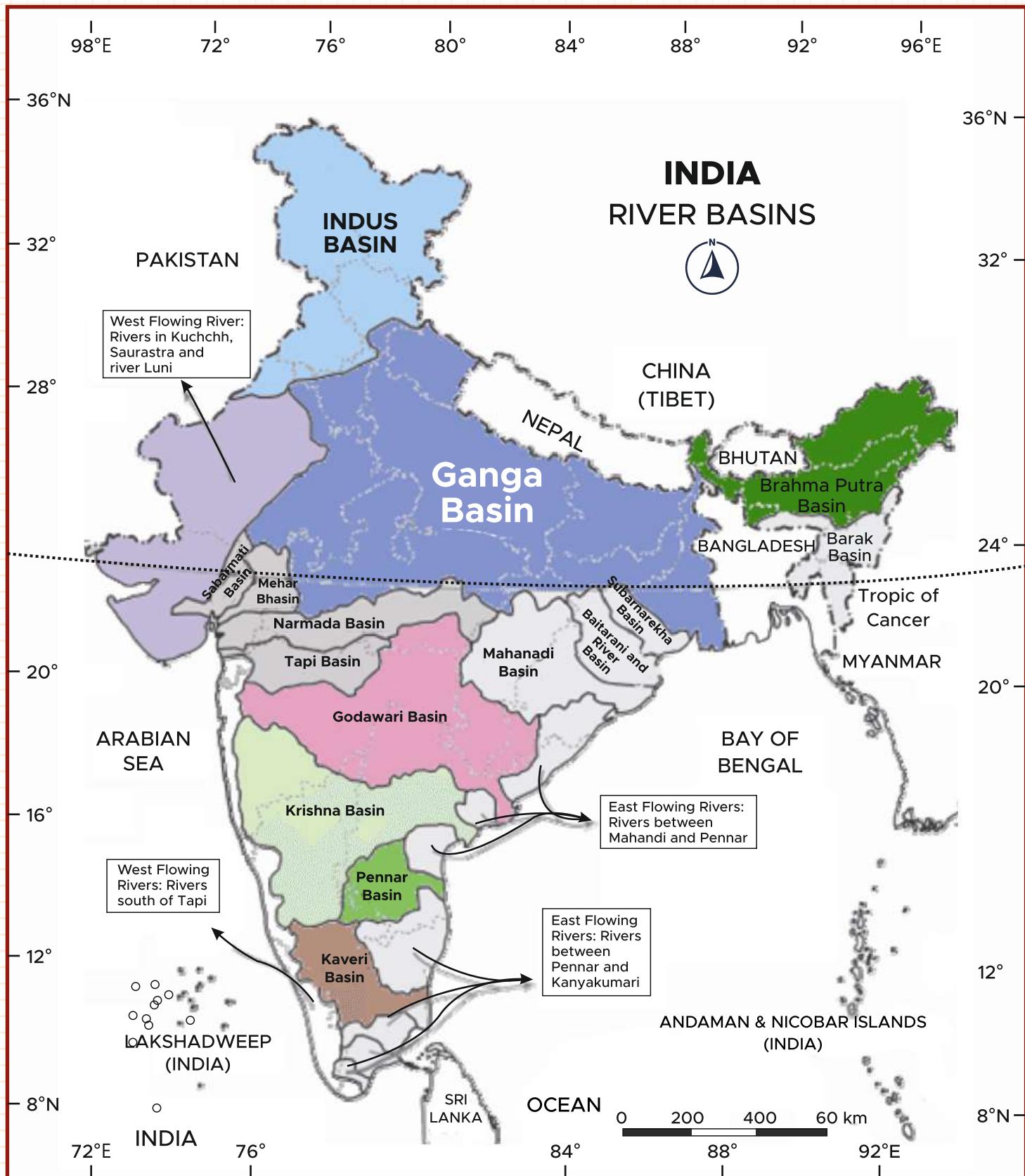
DRAINAGE PATTERN AND TYPES

A geometric arrangement of streams in a region determined by slope, differing rock resistance to weathering and erosion, climate, hydrologic variability, and structural controls of the landscape is known as **drainage pattern**.



TYPES OF DRAINAGE PATTERNS:

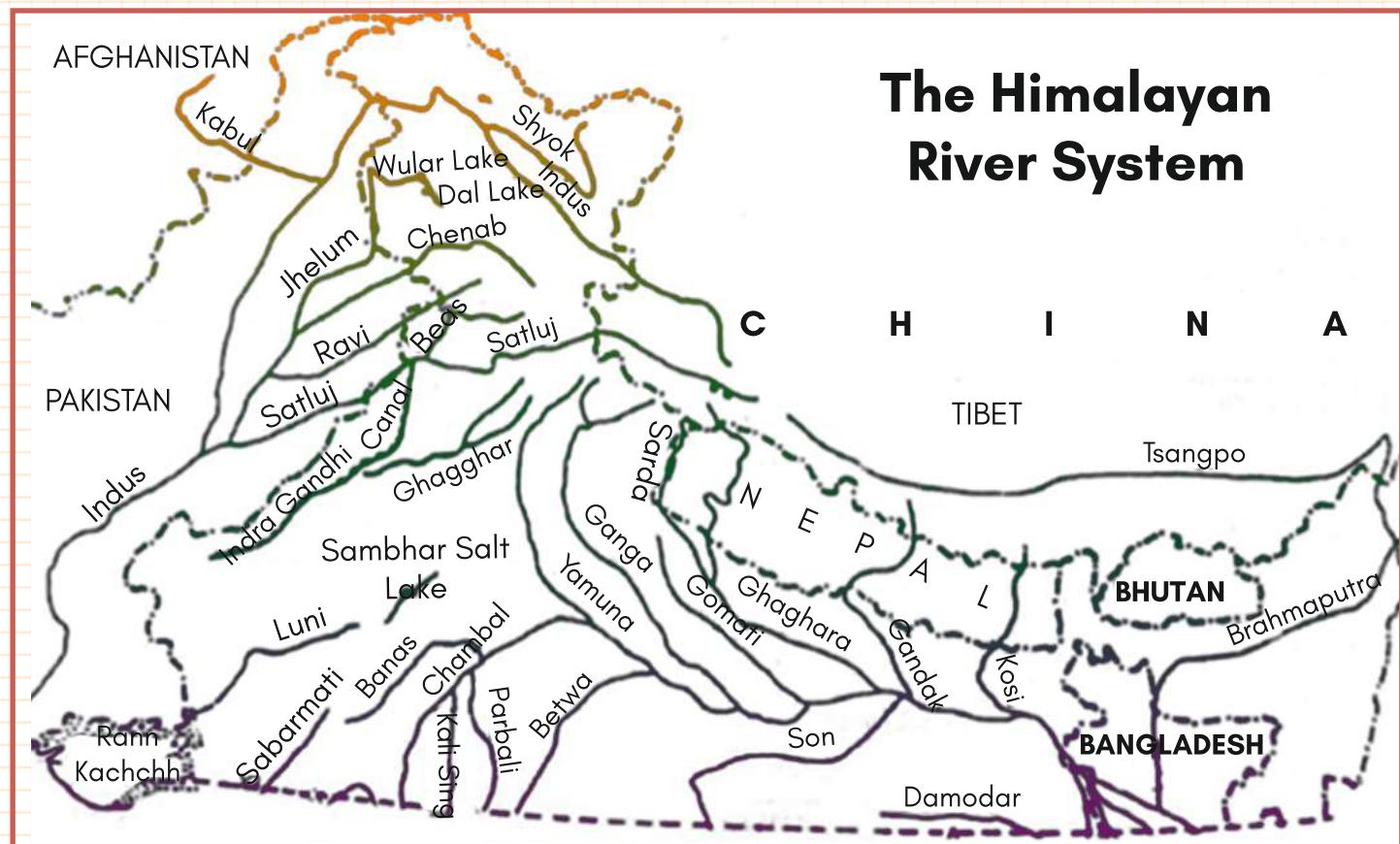






HIMALAYAN RIVER SYSTEM VS PENINSULAR RIVER SYSTEM

Aspects	Himalayan River	Peninsular River
Place of Origin	Himalayan mountain covered with glaciers	Peninsular plateau and central highland
Nature of flow	Perennial	Ephemeral
Type of drainage	Antecedent and Consequent leading to dendritic pattern	Super imposed, rejuvenated resulting in trellis, radial and rectangular patterns
Nature of river	Long course, flowing through rugged mountains experiencing headward erosion and river capturing; In plains meandering and shifting of course	Smaller, fixed course with well adjusted valleys
Catchment age	Very large basins	Relatively smaller basin
Age of the river	Young, active and deepening of valley	Old rivers with graded profile and lateral erosion
Irrigation	Flow through plains and canal system	Flow over uneven plateau; canals only in deltaic region
Hydroelectricity	Eastern region has very high potential and large dams are building up	Natural waterfalls for generating electricity





GANGA RIVER SYSTEM



- The river has a length of 2,525 km and is the **largest river basin** in India with about one-fourth area of the country under it.
- It rises in the **Gangotri glacier** near Gaumukh (3,900 m) in the Uttarakhand where it is known as the Bhagirathi. **At Devprayag, the Bhagirathi meets the Alakananda and both makes Ganga.**
- Along with Brahmaputra, it makes largest delta of the world.
- It flows through major cities of India – Kanpur, Allahabad, Patna, and Kolkata.

Yamuna	<ul style="list-style-type: none"> ► Western most and the longest tributary of the Ganga, has its source in the Yamunotri glacier on the western slopes of Bander punch range (6,316 km). ► Meets Ganga at Allahabad (Prayag). ► The right bank tributaries involve the Chambal, the Sind, the Betwa and the Ken which originates in the Peninsular plateau. ► Hindan, the Rind, the Sengar, the Varuna join it on its left bank. ► It flows through cities such as Karnal, Delhi, and Agra.
Gandak	<ul style="list-style-type: none"> ► The Gandak river comprises two streams, namely Kaligandak and Trishulganga. ► It rises in the Nepal Himalayas between Dhaulagiri and Mt. Everest. ► It enters the Ganga Plains of India in Champaran, Bihar and joins Ganga at Sonpur near Patna.



Ghaghara	<ul style="list-style-type: none">➲ The Ghaghara originates in the glaciers of Mapchachungo. It comes out of the mountain, cutting a deep gorge at Shishapani.➲ The river Sarda joins it in the plain before it finally meets the Ganga at Chhapra. It flows through famous Ayodhya town.
Ramganga	<ul style="list-style-type: none">➲ The Ramganga is the first major tributary to join the Ganga from its left near Kannauj.➲ It rises in the Garhwal hills near Gairsain. A large dam has been built on this river near Kalagarh.
Damodar	<ul style="list-style-type: none">➲ The Damodar drains the eastern parts of the Chotanagpur Plateau where it flows through a rift valley and finally joins the Hugli at Falta.➲ The Barakar is its main tributary. Once known as the 'Sorrow of Bengal' the Damodar has been now tamed by the Damodar Valley Corporation, a multipurpose project.
Chambal	<ul style="list-style-type: none">➲ The Chambal rises near Mhow in the Malwa plateau from Vindhyan. From Kota, it traverses down to Bundi, Sawai Madhopur and Dholpur, and finally joins the Yamuna at Etawah.➲ The Chambal is famous for its badland topography called the Chambal ravines. Ravines are being reclaimed for agricultural and pastoral activities.➲ Banas river is its main tributary. The main dams across the river are Gandhi Sagar (Kota), Rana Pratap Sagar and Jawahar Sagar.
Son	<ul style="list-style-type: none">➲ The Son originates from the Amarkantak plateau. It has length of 780km.➲ After forming a series of waterfall at the edge of plateau, it reaches Arrah, west of Patna to join the Ganga. It is known for its frequent river shifting.
Sharda	<ul style="list-style-type: none">➲ The Sarda or Saryu river rises in the Milan glacier in the Nepal Himalayas where it is known as the Goriganga. Along the Indo-Nepal border, it is called Kali or Chauk, where it joins the Ghaghara.
Mahananda	<ul style="list-style-type: none">➲ The Mahananda is another important tributary of the Ganga rising in the Darjiling hills. It joins the Ganga as its last left bank tributary in West Bengal.



INDUS RIVER SYSTEM



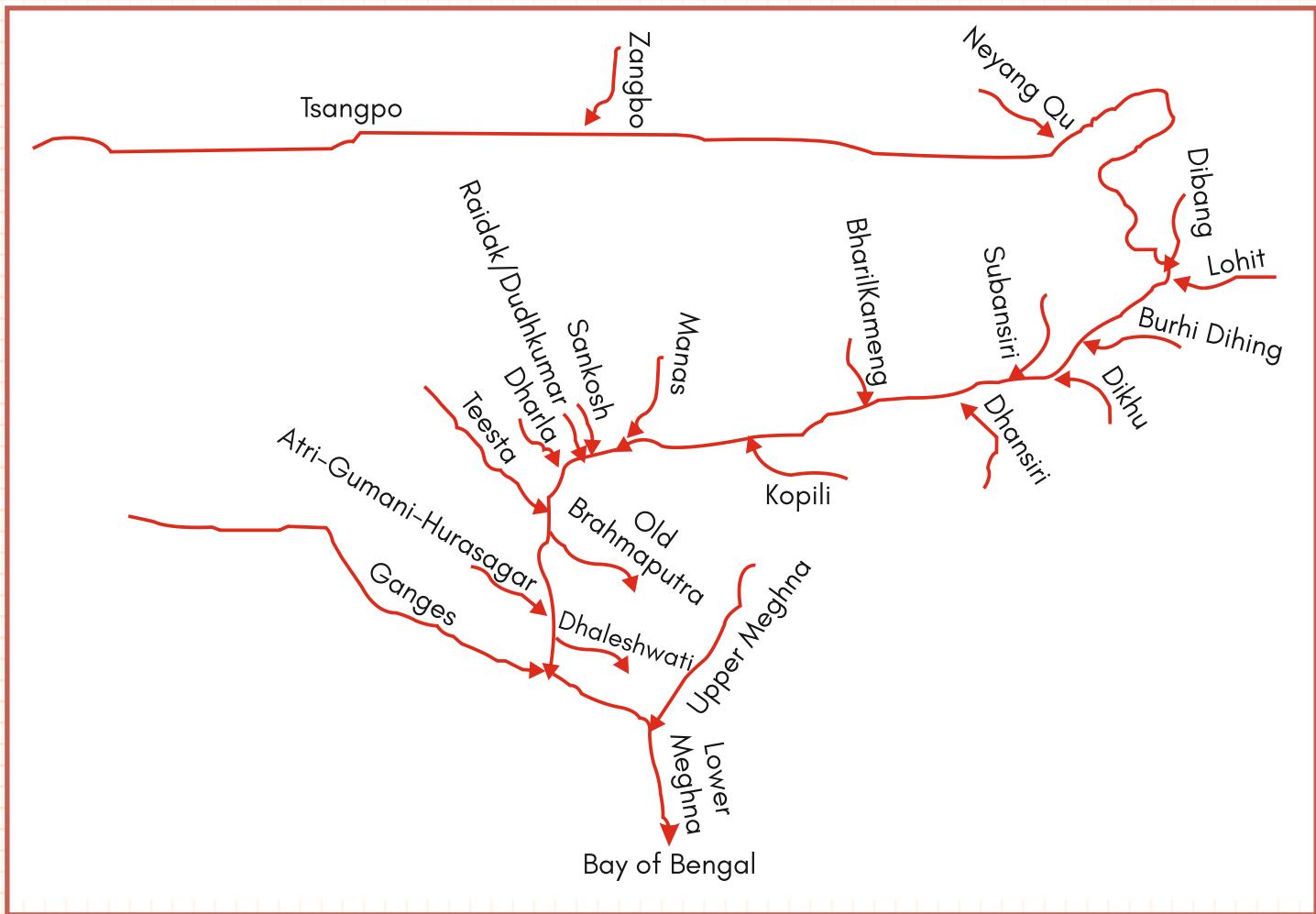
- **The most important drainage systems of the Indian subcontinent and one of the largest in the world.** It covers a length of 2,880 km, out of which 1,114 km length is in India.
- Indus has **origin from a glacier near Bokar Chu** in the Kailash Mountain range in the Tibet province of China. In Tibet, it is known as '**Singi Khamban**'; or Lion's mouth.
- **Zaskar river, Suru river, Soan river, Dras, Panjnad** rivers are its major left-bank tributaries.
- **Shyok River, Gilgit river, Hunza river, Swat river, Kunnar river, Kurram river, Gomal River, Tochi, Khurram and Kabul river** are its major right-bank tributaries.
- The River finally drains into the Arabian Sea, east of Karachi city.

Jhelum	<ul style="list-style-type: none">► Rises from a spring at Verinag Spring situated at the foot of the Pir Panjal.► Flows through Srinagar and the Wular lake before entering Pakistan.► Joins the Chenab in Pakistan.
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Chenab	<ul style="list-style-type: none">☞ The Chenab (Asikni) flows in India for about 1180km draining around 26,755 sq km area.☞ It is the largest tributary of the Indus.☞ It is formed by two streams, the Chandra and the Bhaga Hence, it is also known as Chandrabhaga.☞ Major hydro power plants installed in Chenab are Salal, Baghliar, and Dulhasti.
Ravi	<ul style="list-style-type: none">☞ The Ravi (Parushni) river flows for about 725 km and drains 6000 sqkm area in India.☞ Rises near the Rohtang Pass in Kullu hills in Himachal Pradesh.☞ Flows through the famous Chamba valley.☞ Drains an area lying between Pir Panjal and Dhauladhar ranges.
Beas	<ul style="list-style-type: none">☞ The Beas (Vipasa) river originates from the Beas Kund near the Rohtang Pass.☞ Flows through the Kullu valley & Kangra Valley.☞ Enters the Punjab plains where it meets the Satluj near Harike in India's Punjab.☞ Indira Gandhi Canal that feeds western Rajasthan has origin at Harike, confluence of Beas and Satluj.
Satluj	<ul style="list-style-type: none">☞ The Satluj (Satadru) river rises from the Rakas Lake near Mansarovar (4,555m) in Tibet.☞ This is an antecedent river.☞ Passes through the Shipki La (4300 m) on the Himalayan ranges at India-China border.☞ It cuts the Zaskar ranges, Daula Dhar range, Shiwalik and finally enters the Punjab plains.☞ Feeds the canal system of the Bakra Nangal project.
Ghaggar	<ul style="list-style-type: none">☞ The Ghaggar (Saraswati) is an inland drainage which rises in the talus fan of the Shiwalik near Ambala, Haryana.☞ After entering the plains, it disappears but reappears at Karnal. Further on, the stream disappears near Hanumargarh in Bikaner.☞ It is believed that it is an old tributary of the Indus.

BRAHMAPUTRA RIVER SYSTEM

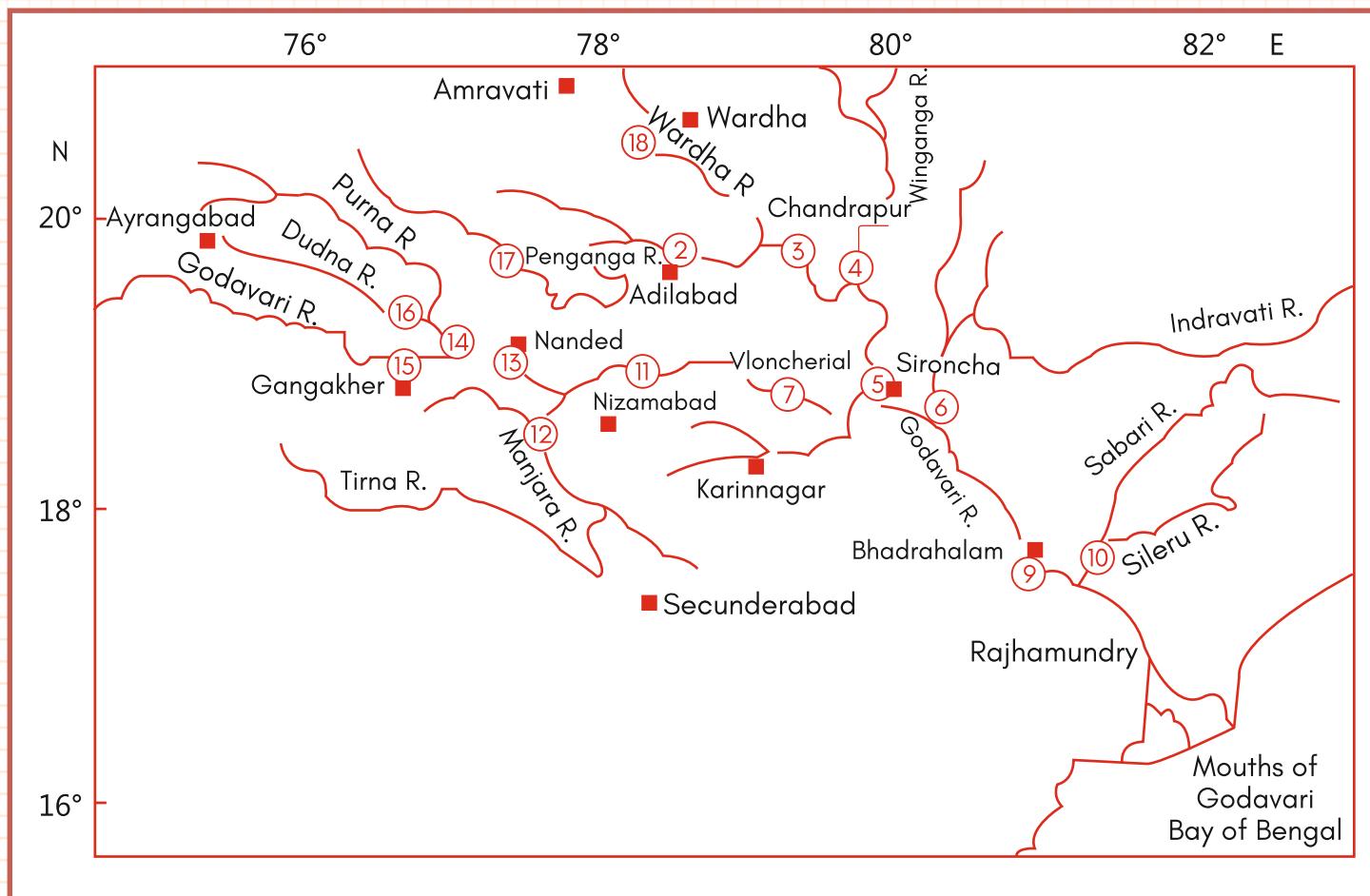


- The Brahmaputra is one of the largest rivers of not only India but the world. Its total length is 2900 km and basin area is 5,80,000 sq km (916 km and 1,87,00 sq km in India).
- Its origin is in the **Chemayungdung glacier** of the Kailash range near the Mansarovar lake. From here, it flows parallel to the Greater Himalayas in the dry and flat Tibetan region where it is known as **Tsangpo**.
- The river emerges from the foothills under the name of Siang or Dihang.
- In Bangladesh, the Tista joins it on its right bank from where the river is known as the **Jamuna**.

Left Bank Tributaries	► Dibang or Sikang, Lohit, Burhi Dihing, Dhansari (South) and Kalang
Right Bank Tributaries	► Subansiri, Kameng, Manas and Sankosh



GODAVARI RIVER SYSTEM

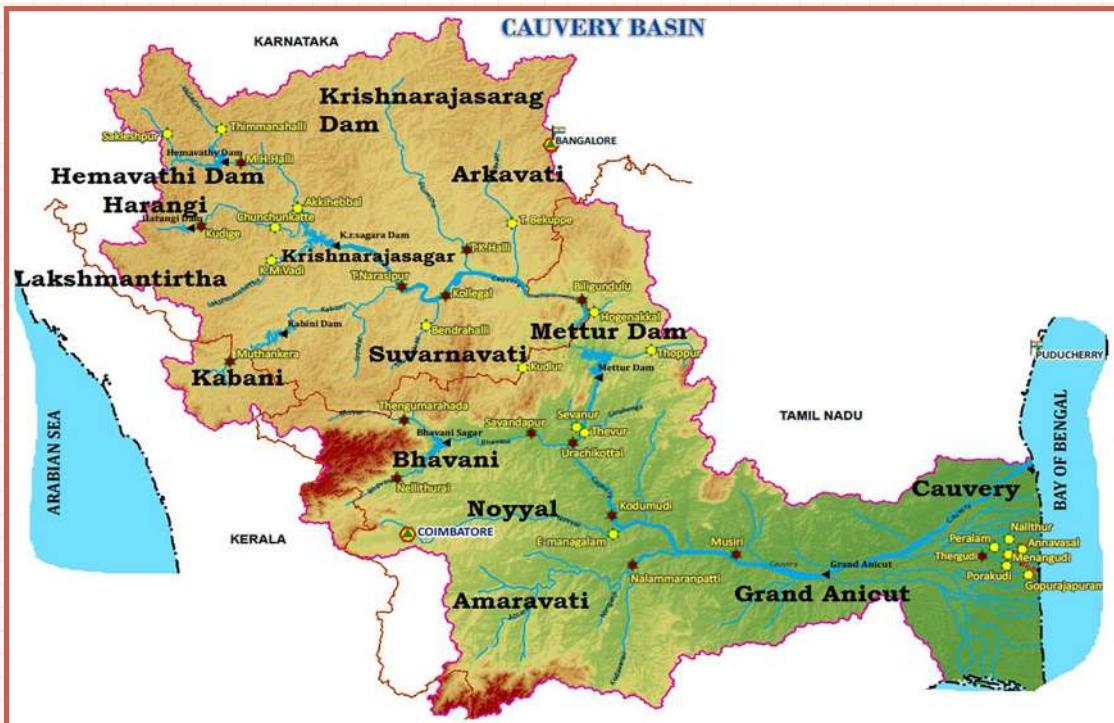


- The Godavari is the **largest Peninsular river**. It is 1,465 km long with **49 per cent** of river course, lying in Maharashtra.
- The Godavari River is the **second-longest course** in India with brownish water.
- The river is often referred to as the **Dakshin (South) Ganga or Vridhh (Old) Ganga**.
- This river originates from **Trimbakeshwar**, near Nasik in Maharashtra.
- It flows southeast across south-central India through the states of **Madhya Pradesh, Telangana, Andhra Pradesh, and Orissa**, and drains into the Bay of Bengal.
- The river forms a fertile delta at Rajahmundry.

Left Bank	► Purna, Pranhita (Penganga and Warda), Indravathi, Sabari
Right Bank	► Dharna river, Pravara river, Sindphana river, Manjira river, Peddavagu river



CAUVERY RIVER BASIN



- The Kaveri rises in **Brahmagiri hills** (1,341m) of Kogadu district in Karnataka. Its length is 800 km.
- It flows into the Bay of Bengal at **Kaveripatnam**. It drains parts of Tamil Nadu, Karnataka and Kerala. Its important tributaries are the Kabini, the Bhavani and the Amravati.

Left Bank	• the Harangi, the Hemavati, the Shimsha and the Arkavati.
Right Bank	• Lakshmantirtha, the Kabbani, the Suvarnavati, the Bhavani, the Noyil and the Amravati

KRISHNA RIVER SYSTEM

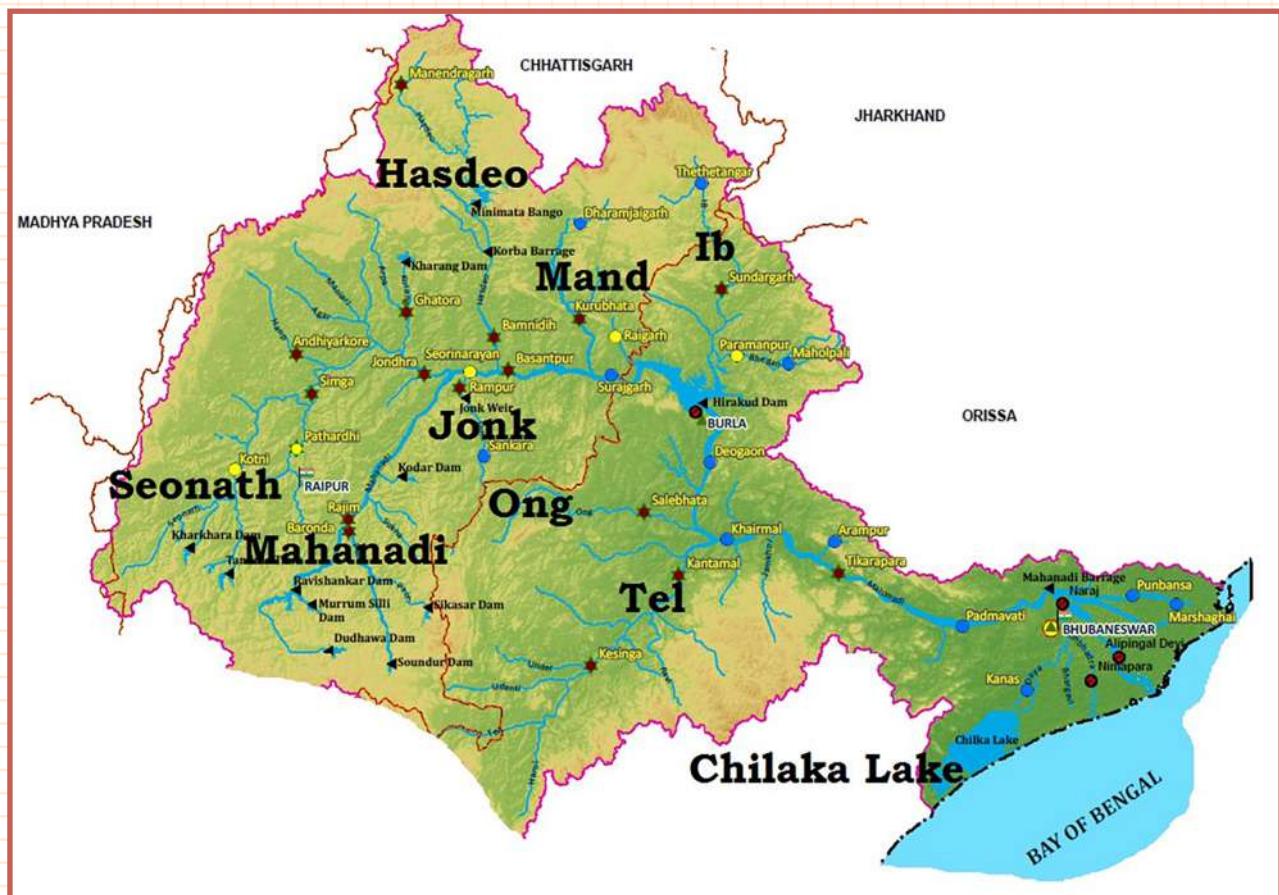




- Krishna is one of the longest rivers of India, which originates from **Mahabaleshwar** in Maharashtra.
- The river flows through the states of **Maharashtra, Karnataka, Telangana and Andhra Pradesh**.
- Tungabhadra River** is the main tributary which itself is formed by the Tunga and Bhadra rivers that originate in the Western Ghats.
- Dudhganga Rivers, Koyna, Bhima, Mallaprabha, Dindi, Ghataprabha, Warna, Yerla, and Musi are some of the other tributaries.

Left Bank	the Bhima, Koyna, the Musi and the Munneru.
Right Bank	The Ghataprabha, the Malprabha and the Tungabhadra

MAHANADI RIVER SYSTEM



- The Mahanadi rises near Sihawa, **Amarkantak hills** in the highlands of Chhattisgarh and runs through Orissa to discharge its water into the Bay of Bengal. It is 851 km long.
- It flows east to the Bay of Bengal. The river drains of the state of **Maharashtra, Chhattisgarh, Jharkhand, and Orissa**.
- The largest dam, **the Hirakud Dam** is built on the river.

Left Bank	Sheonath, Mand, Ib, Hasdeo
Right Bank	Ong, Jonk, Tel



NARMADA RIVER SYSTEM



- The Narmada originates on the western flank of the **Amarkantak plateau** at a height of about 1,057 m.
- Flowing in a **rift valley between the Satpura in the south and the Vindhyan range** in the north, it forms a picturesque gorge in marble rocks and **Dhuandhar waterfall** near Jabalpur.
- It meets the Arabian Sea south of Bharuch, forming a broad 27 km long estuary. Its length is 1312 km.
- All the **tributaries are very short and make trellis pattern**. The **Sardar Sarovar Project** has been constructed on this river.

Left Bank	► Burhner River, Banjar River, Shar River, Shakkar River, Dudhi River, Tawa River, Ganjal River, Chhota Tawa River, Karjan River
Right Bank	► Hiran River, Tendoni River, Kolar River, Hatni River, Orsang River

OTHER NOTABLE RIVERS

West Flowing Rivers	
Tapi	<ul style="list-style-type: none"> ► Originates from Multai in the Betul district of Madhya Pradesh and discharge in Surat district, Gujarat. ► The Purna, Girna and Panjhra are its important tributaries.
Luni	<ul style="list-style-type: none"> ► Luni is the largest river system of Rajasthan, west of the Aravallis. ► Originates near Pushkar in two branches, i.e. the Saraswati and the Sabarmati. ► Flows towards the west till Telwara and then takes a southwest direction to join the Rann of Kutch.
Mahi	<ul style="list-style-type: none"> ► The Mahi river rises in the Satmala hills of the Vindhyan mountains. ► After flowing for 533km, it drains into the Gulf of Khambhat. ► It is only river which cuts through Tropic of Cancer Twice along its course.



Sabarmati	<ul style="list-style-type: none"> ❑ Rises in the Aravalli hills ❑ Flows into Arabian Sea after flowing over a distance of 300km.
Bharathapuzha and Periyar	<ul style="list-style-type: none"> ❑ The longest river of Kerala, rises near Annamalai hills. Also known as Ponnani. ❑ The Periyar is the second largest river of Kerala.
Sharavati	<ul style="list-style-type: none"> ❑ Important river in Karnataka flowing towards the west. ❑ The Sharavati originates in Shimoga district of Karnataka.
Zuari and Mandovi Rivers	<ul style="list-style-type: none"> ❑ The Mandovi and the Zuari are rivers in the state of Goa. ❑ Mahadayi/Mandovi River is described as the lifeline of the Indian state of Goa. ❑ Mandovi joins with the Zuari at a common creek at Cabo Aguada, forming the Mormugao harbour. ❑ Panaji, the state capital is situated on the left bank of the Mandovi.
East Flowing Rivers	
Brahmani	<ul style="list-style-type: none"> ❑ Comes into existence by the confluence of the Koel and the Sankh rivers near Rourkela. ❑ The basin is bounded in the North by Chhotanagpur plateau, in the West and South by the Mahanadi basin and in the East by the Bay of Bengal. ❑ The basin flows through Jharkhand, Chhattisgarh and Orissa States and drains into Bay of Bengal. ❑ Together with the river Baitarani, it forms a large delta before emptying into the Bay of Bengal at Dhamra Port.
Vaigai	<ul style="list-style-type: none"> ❑ South of the Cauvery delta, there are several streams, of which the Vaigai is the longest. ❑ This basin is bounded by the Varushanadu hills, the Andipatti hills, the Cardaman hills and the Palani hills on the West and by the Palk strait and Palk Bay on the East. ❑ The Vaigai entirely lies in the state of Tamil Nadu.
Pennar	<ul style="list-style-type: none"> ❑ The Pennar (also known as Uttara Pinakini) rises in the Chenna Kasava hill of the Nandidurg range, in Chikkaballapura district of Karnataka. ❑ Pennar basin extends over states of Andhra Pradesh and Karnataka. ❑ The fan shaped basin is bounded by the Erramala range on the north, by the Nallamala and Velikonda ranges of the Eastern Ghats on the east, by the Nandidurg hills on the south. ❑ The other hill ranges in the basin to the south of the river are the Seshachalam [famous for Red Sanders] and Paliconda ranges.
Subarnarekha	<ul style="list-style-type: none"> ❑ The Subarnarekha originates from the Ranchi Plateau in Jharkhand forming the boundary between West Bengal and Odisha in its lower course. ❑ Joins Bay of Bengal forming an estuary between the Ganga and Mahanadi deltas.



IMPORTANT NATIONAL WATERWAYS

National Waterways

TOTAL LENGTH:

4,503 KM

TOTAL STATES SERVED

15

Arabian Sea

Mandovi, Zuari River & Cumberjua Canal

NW-3

WEST COAST CANAL
KOLLAM TO KOTTAPURAM

205 Km

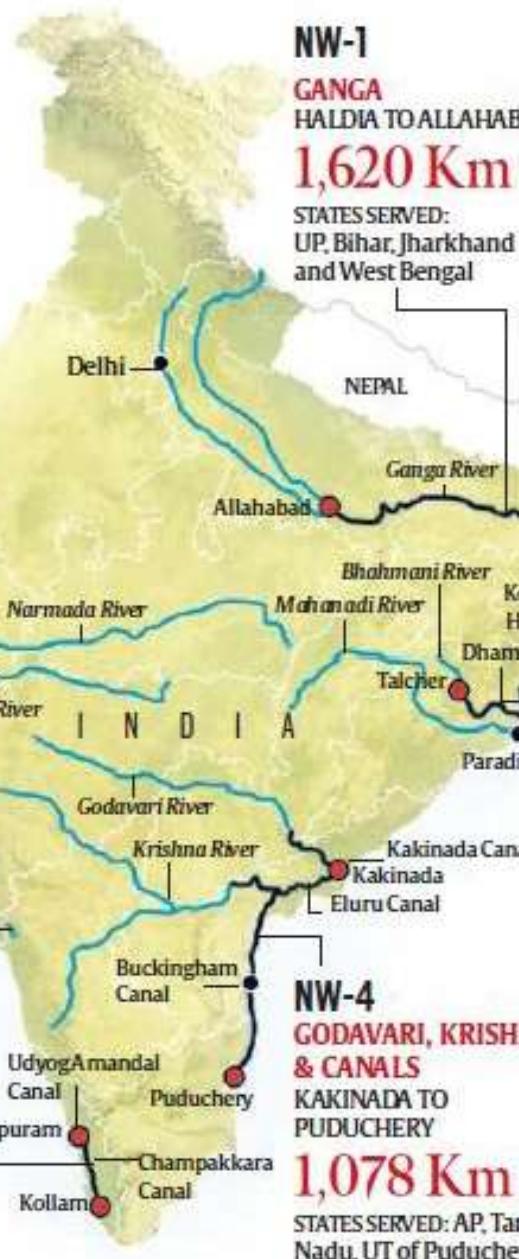
STATE SERVED: Kerala

NW-1

GANGA
HALDIA TO ALLAHABAD

1,620 Km

STATES SERVED:
UP, Bihar, Jharkhand
and West Bengal

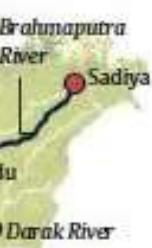


NW-2

BRAHMAPUTRA
DHUBRI TO SADIYA

891 Km

STATES SERVED:
Assam, West Bengal, Arunachal
Pradesh, Meghalaya



NW-6

BARAK
LAKHIPUR TO BHANGA
(IN PROCESS)

121 Km

STATES SERVED:
Assam, Mizoram,
Manipur, Tripura

NW-5

**BRAHMANI, DELTA
CANALS, ECC**
GOENKHALI TO TALCHER

588 Km

STATES SERVED: Odisha,
West Bengal

NW-4

**GODAVARI, KRISHNA
& CANALS**

KAKINADA TO
PUDUCHERRY

1,078 Km

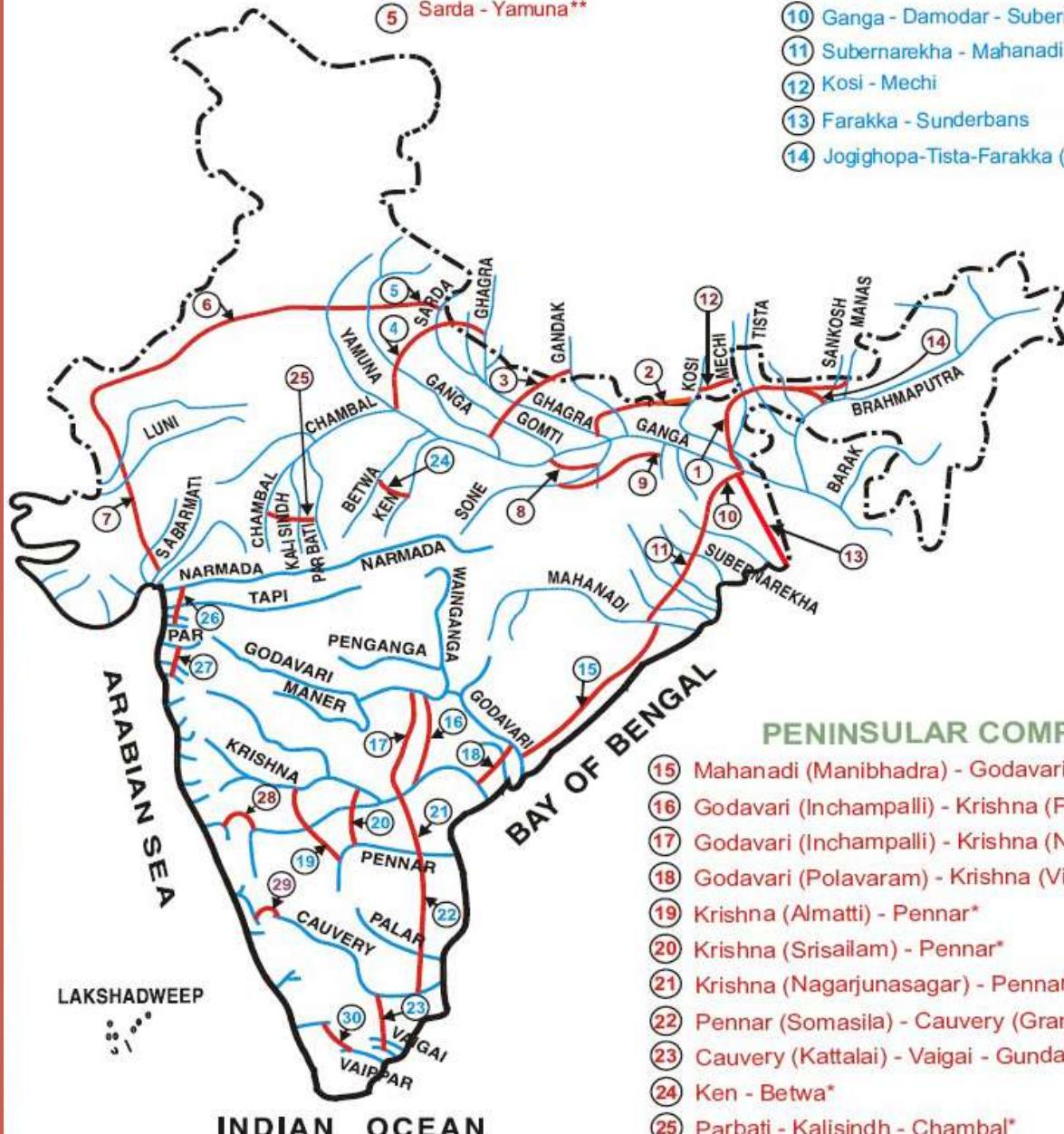
STATES SERVED: AP, Tamil
Nadu, UT of Puducherry



PROPOSED INTER BASIN WATER TRANSFER LINKS

HIMALAYAN COMPONENT

- (1) Manas-Sankosh-Tista-Ganga
- (2) Kosi - Ghagra
- (3) Gandak - Ganga
- (4) Ghagra - Yamuna**
- (5) Sarda - Yamuna**
- (6) Yamuna - Rajasthan
- (7) Rajasthan - Sabarmati
- (8) Chunar - Sone Barrage
- (9) Sone Dam-Southern Tributaries of Ganga
- (10) Ganga - Damodar - Subernarekha
- (11) Subernarekha - Mahanadi
- (12) Kosi - Mechi
- (13) Farakka - Sunderbans
- (14) Jogighopa-Tista-Farakka (Alternative to 1)



PENINSULAR COMPONENT

- (15) Mahanadi (Manibhadra) - Godavari (Dowlaiswaram)*
- (16) Godavari (Inchampalli) - Krishna (Pulichintala)*
- (17) Godavari (Inchampalli) - Krishna (Nagarjunasagar)*
- (18) Godavari (Polavaram) - Krishna (Vijayawada)*
- (19) Krishna (Almatti) - Pennar*
- (20) Krishna (Srisailam) - Pennar*
- (21) Krishna (Nagarjunasagar) - Pennar (Somasila)*
- (22) Pennar (Somasila) - Cauvery (Grand Anicut)*
- (23) Cauvery (Kattalai) - Vaigai - Gundar*
- (24) Ken - Betwa*
- (25) Parbati - Kalisindh - Chambal*
- (26) Par - Tapi - Narmada*
- (27) Damanganga - Pinjal*
- (28) Bedti - Varda
- (29) Netravati - Hemavati
- (30) Pamba - Achankovil - Vaippar*